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ABSTRACT

A study sought to develop a measure to assess educational self-direction of teachers in continuing education. A questionnaire with three dimensions of educational self-direction--closeness of supervision, routinization, and substantive complexity of work--was administered to supervisors, teachers, teacher aides, parent coordinators, social workers, and trainers. The questionnaire was derived from theory and research which explored the characteristics of various occupations and the relationship between these and the psychological functioning of employees. A description is presented of how the theory can be used to analyze the learning environments of teachers in continuing education. The development of the instrument is documented, and data related to the reliability and validity of the instrument is presented. The relationship between measures obtained from this instrument and two aspects of the psychological functioning of teachers--intellectual flexibility and beliefs about teaching--are discussed. (CB)

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The Relationship Between Dimensions of an Inservice Training Program, Intellectual Flexibility and Beliefs about Teaching

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A major problem, common to both the fields of teacher education and adult education, is assessment of educational experience. Typically, assessment has involved counting the number of courses, hours and credits; classifying the courses into broad content areas; and determining if the courses are taught in a University, school, community setting.(e.g. Cross, 1981, Yarger; Howey & Joyce, n.d.).

Obviously these approaches give little or no information about what it is in the educational experience that contributes to change in the adult students. What is needed is a way of systematically assessing the educational learning environment of adults and relating this assessment to psychological changes in the adult students.

In this paper I briefly describe a theory that can be used to analyze the learning environments of teachers in continuing education, document the development of an instrument dervied from this theory, present data related to the reliability and validity of the instrument, and discuss the relationship between measures obtained from this instrument and two aspects of psychological functioning of teachers, intellectual flexibility and beliefs about teaching.

The instrument was derived from the theory and research of Kohn and colleagues (Kohn 1969, Kohn & Schooler 1983; Miller, Schooler, Kohn & Miller, 1979) which explored the characteristics of various occupations and the relationship between these occupational characteristics and the psychological functioning of employees. The major premise of this work is that the conditions of adults' lives, and occupational conditions in particular,

influence their psychological functioning. Kohn and his colleagues have focused on occupational self-direction, that is the particular conditions that facilitate or restrict the use of initiative, thought and independent judgment in work. Three occupational conditions appear critical to occupational self-direction: substantive complexity of work, freedom from closeness of supervision, and low routinization (Kohn, 1969; Kohn & Schooler, 1983).

Substantive complexity of work is the degree to which performance of the work requires thought and independent judgement. By its very nature, substantively complex work requires decisions that must take into account ill-defined or apparantly conflicting contingencies.(Kohn & Schooler, 1983, p. 127). Complexity of work involves three aspects: complexity of work with data (including ideas, concepts, and symbols), people, and things. Assessement of job complexity was based on the classifications in the Dictionary of Occupational Titles (U.S. Department of Labor, 1965). According to these classifications secondary school teachers and accountants have high levels of complexity and farmers and mechanics low levels.

Closeness of supervision involves both the latitude individuals' supervisors allow them and the amount of supervisory control exercised. Closeness of supervision restricts the degree of occupational self-direction possible to individuals, although freedom from close supervision does not necessarily mean that individuals are required or free to use initiate, thought or independent judgement (Miller et al., 1979 p. 72).

Highly routine work environments are repetitive and

predictable and restrict the possibilities for exercising self-direction. Jobs with a variety of unpredictable tasks may facilitate or require initiate, thought and judgment (Miller et al., 1979, p.72).

Data from a 10-year longitudinal study indicate that occupational self-direction does influence a number of aspects of psychological functioning including intellectual flexiblity, parental values of self-direction, personal standards of morality, trustfulness, self-confidence, and lack of fatalism. (Kohn & Schooler, 1983).

Kohn's theoretical background was choosen as the basis for the current research for two reasons. First, it has empirical and theoretical meaning for the everyday lives of adults. Second, it has been argued that the analysis of job conditions can applied be to educational environments (Bronfenbrenner, 1979; Miller et al, 1983). It is clear that learning environments vary in their level of routinization, that is the repetitiveness and predictabiliy of the work. They also vary in the degree of supervision, that is the amount of freedom the students are allowed in determining the the nature of the learning (e.g., content, requirements), the scheduling of the learning (e.g. when assignments are due), and the freedom the students feel to disagree with their instructor.

Educational environments also vary in the nature of the substantive complexity of work. Some situations require predominantly lower levels of work with data, that is, comparing and computing, whereas others require the higher levels such as sythesizing and analyzing. Similarily, educational environments vary in their degree of complexity of work with people: some

require only lower levels such as receiving instructions (including listening to the lecturer), others require higher levels such as negotiating or exchanging information and ideas in group projects. Many higher educational learning environments do not require work with things.

Applying the theory and research of Kohn and his collegues leads to the following question: Do learning environments that provide educational self-direction, that is, freedom from supervision, lack of routinization, and substantive complexity of work, promote intellectual flexibility and values of self direction in the learners?

In order to answer this question a questionnaire was developed which assessed the three dimensions of educational self-direction (freedom from supervision, lack of routinization and substantive complexity of learning). This questionnaire, and assessments of intellectual flexibiliy and beliefs about self-direction for children's learning, were given to a group of teachers in inservice training. The reliability and validity of the instrument, and the relationship among educational self-direction, intellectual flexibility, and beliefs about teaching were examined.

Method

Subjects

There were two groups of subjects: trainees and trainers. The 151 trainees were supervisors, teachers, teacher aides, parent coordinators, or social worker aides employed by Head Start in 1

of 13 training programs in a five-state region in the mid-Atlantic area. The training, called Child Development Associate (CDA) training, is typically a two-year program which involves a mixture of child development courses, methods courses and supervised practicum experiences. The training is arranged thought local college or universities and the trainees receive college credit for their courses. Nearly half of the trainees had no prior college experience before the CDA training. The age range was 21 to 69 years with the mean age 35.6 years. One third of the subjects were black. All but two trainees were female.

The 13 trainers all had some graduate training and were white. One trainer was male.

Measures

Educational Self-Direction A questionnaire, which assessed three dimensions of educational self-direction (closeness of supervision, routinization, and complexity of work), was developed from the original interview questions used by Kohn (1969).

Twenty-three likert-type items were generated which assessed closeness of supervision. (e.g.," The instructor decides what the students do and how they do it," "The instructor is flexible with assignment dates and deadlines." Routinization was assessed by twentyone likert-type items which assessed overall repetitiveness and predictability of the program (e.g., "When I come to class I can predict what will happen that day," "The kinds of things I do in relation to my training vary greatly").

Complexity of work involved two aspects, complexity of work with data (including knowledge, ideas, concepts and verbal

symbols) and complexity of work with people. Complexity of work with data and people was assessed by Kohn and colleagues (Kohn, 1969; Kohn & Schooler, 1983) by categorizing responses to open-ended interview questions according to the scales in the Dictionary of Occupational Titles (U.S. Department of Labor, 1965). Because poor write-in responses often result from open-ended questionnaire items, complexity of work with data and with people was assessed in the following manner. A brief description of the each category of complexity of work with people and data was included in the questionnaire and subjects were asked to rate on a 5-point scale how often they did each category. (The descriptors were never, occasionally, moderately often, frequently, and very frequently). Subjects were also asked to check which category they spent the most time on, the number of hours spent in work with data, and the number of hours spent in work with people.

The category descriptions for complexity of work with people were derived from the Dictionary of Occupational Titles (U.S. Department of Labor, 1965) and included receiving instructions or listening to a lecture, discussion (including class discussion, 1-1 discussion with the instructor, and informal out-of-class discussion with other students), group projects, negotiating with the instructor, and peer tutoring.

It was decided to use a readily known educational taxonomy for classifying complexity of work with data, rather than the scale in the Dictionary of Occupatonal Titles which has limitations when applied to educational work settings (Sutton, 1984). Bloom's taxonomy was used, thus the categories were memorizing,

comprehending, analyzing, applying, synthesizing and evaluating.

Intellectual Flexibility. This was asessed by the the Test of Behavioral Rigidity (Schaie & Parham, 1975). This test consists of three subtests, one assessing motor-cognitive rigidity, one personality-perceptual rigidity, and one psychomotor speed. Retest correlations (corrected by the Spearman-Brown formula) range from .40 to .60 over a 7 year period. Reliability, using estimates from ANOVA, range from .83 to .95 for the factor scores (Schaie & Parham, 1975).

Teacher Beliefs Beliefs about self-direction in children's learning were assessed by the Teacher Belief Inventory developed by Verma and Peters (1975). This questionnaire contains 2 subscales each with 10 items. One subscale emphasized educational self-direction, i.e., child autonomy, learning through experimentation and emotional development. The other subscale emphaizes a teacher-centered approach to teaching. Previous research has shown the subscales have reliability coefficients of .60 (for the educational self-direction scale) and .71 (for the teacher-centered scale) using as subjects Head Start employees in CDA training (Peters & Sutton, in Press).

Demographic Information Information on the subjects age, previous educational level, previous work experience, current job title and family status was obtained through a short questionnaire. Current job title was rated on a three-point scale from the most to the least responsibility. (1=supervisor, 2=teacher, social worker or home visitor, 3=teacher aide). Previous educational level was assessed on a 5 point scale (1= high school diploma, 5=advanced degree).

Procedure

The measures were administered to the trainees during regular training sessions during February-April, 1983. Completion of the questionnaires took between 50 and 90 minutes. The trainers completed the questionnaire assessing educational self-direction while the trainees completed the total package of questionnaires.

Results

Reliability and Measurement Model Analysis

Separate analyses were conducted on each of the three scales: routinization, closeness of supervision and complexity of work. For each scale, determination of the final items included was made on the basis of both statistical and conceptual criteria. Two sets of statistical analyses were used for the routinization and closeness of supervision scales: confimatatory factor analysis, specifying a one-factor model with no correlations among the error terms (using LISRELV); and item analysis, giving Alpha for the total scale, item-total correlations, and squared multiple correlations for each scale (using the SPSS RELIABILITY program).

After a series of several modifications (see Sutton, 1984 for details), 10-item scales were derived for both closeness of supervision and routinization. (See Tables 1 and 2 respectively). For the closeness of supervision scale, the confirmatory factor analysis statistics indicated a unidimensionsal scale with a good

fit of a one-factor model. The ratio χ^2 /df was 2.1. This is in the range considered a good fit (Carmines & McIver, 1981). The Goodness of Fit index (Joseskog & Sorbom,1981) was high at .91 (the maximim possible is 1.00). The LISRELV program calculates T-values for each item. A T-value is the factor loading divided by the standard error and T-values of greater than 2 are considered significant (Joreskog & Sorbom, 1981). The T-values for each of the final 10 closeness-of-supervision items were greater than 2 (See Table 1). The item-total correlations were above .15 and Alpha was .64.

Table 2 gives the statistics for the final 10-item routinization scale. All item-total correlations were greater than .18, and Alpha was .68. The ratio of χ^2 /df was 2.5, and the Goodness of Fit index was .85. All T-values were greater than or equal to 1.5.

The measures of complexity of work with people and data were quite different from the measures of routinization and closeness of supervision. Thus, the measurement analysis and reliability estimates were also different. The seven items assessing complexity of work with people were placed in a one-factor confirmatory factor analysis and the results are given in Table 3. The ratio χ^2 /df was 2.95, and the goodness of fit index was .90. There were only two T-values less than 2. These were the amount of time spent working with people and the category on which most time was spent. The items that contributed most to the factor were the five items asking how frequently certain categories were done.

Extra questions were used in assessing complexity of work

with data. The frequency of each category was assessed by a general question and by two specific examples. For example, the specific examples for synthesize were "sythesize content, ideas etc., across a term's or year's work for a project, presentation, paper," and "listen to your instructor synthesize material from different courses, or material taught at different times of the year." First, the correlations among the 3 items in each category were calculated. For all the categories these were high, significant, and positive, so the 3 items within each category were combined. Thus seven items were placed into the confimatory factor analysis: the amount of time spent working with data, the frequency each of the 6 categories were done, and the category on which most time was spent. The results of the factor analysis are given in Table 4. The ratio χ^2 /df was 2.95, and the Goodness of Fit index was .84. Only one T-value was less that 2 and this was for the time spent with working with data.

After it was determined that both the measures for complexity of work with data and with people separately fit a one-factor model, the items of both scales were analyzed together to determine if they adequately fit a one-factor model. The results of the confirmatory factor analysis indicated that the one- model was a good fit (χ^2 /df=2.3; GFI=.76)

The factor structure of the final version of the questionnaire is given in Figure 1. There was a significant correlation (.33) between the factors closeness of supervision and routinization. The correlations among the other factors were not significant.

Valditiy

The questionnaire was intended to be a measure of the environment, not a reflection of the individual perceptions and beliefs of the students. If the measure does assess the educational environment then between groups (classes) variance should be greater than within groups variance. This was tested by MANOVA first using the sum of the items for each scale as the dependent variables, and second using the weighted sums calculated from factor scores on the items for each scale as dependent variables. The multivariate test was significant at the .001 level for both analyses. For the raw scores the univariate tests for both routinization ($p<.001$) and closeness of supervision ($P<.05$) were significant. For the factor scores, the univariate test for routinization was significant at the .001 level, whereas the test for closeness of supervision was significant at only the .1 level. The univariate test for complexity was not significant in either analyses.

The responses of the trainees on the three dimensions of closeness of supervision, routinization, and complexity of work were compared with the responses of their own trainer. Only 10 of the 13 trainers provided complete data for the three scales. For each group, the trainer's score was subtracted from the trainee's scores for each scale and it was determined whether this difference score was significantly different from 0. This was done using MANOVA which not only gives information on group differences (which are not revelant here), but also shows whether the mean of the scale is significanlty different from 0. The multivariate tests for both the raw and factor scores were

significantly different from 0. This means that the the difference scores were significantly different from 0. That is, the trainer's scores were significantly different from the trainees' scores. The univariate tests were significant for each of the three factors, rountization (for both raw and factor scores), closeness of supervision (for factor scores only), and complexity of work (for raw and factor scores). The trainees rated their classes as more routine, more closely supervised, and more complex than did the trainers.

Relationship Between Educational Self-Direction and Beliefs about Self-Direction in Children's Learning.

The relationship between educational self-direction and beliefs about self-direction in children's learning was tested using structural equation modeling. Before the structural equations modeling analyses could be performed the factor structure of both subscales of the Peters and Verma (1973) instrument had to be determined. This was done separately for each scale using confirmatory factory analysis and specifying a one-factor model. It was found that a one factor model fit each subscale well (For beliefs about self-direction, $\underline{\chi}^2/\underline{df}$=1.59, GFI=.93; For the teacher centered beliefs, $\underline{\chi}^2$ /$\underline{df}$= 2.4, GFI=.88).

In the structural equations modeling the results of the previous measurement model analyses were used. The factor loadings from the previous measurement model analayses were fixed in the program (LISRELV) and only the relationships among the latent variables were permitted to vary. Educational self-direction (routinization, closeness of supervison, and complexity of work)

were specified as exogeneous ("independent") variables and the beliefs about childrens learning specified as endogeneous ("dependent") variables. Previous educational experience and complexity of current job were also included as exogeneous variables.

The first structural equation analyses examined the relationship between educational self-direction and beliefs about educational self-direction in children's learning. The results are given in Figure 2. The overall goodness of fit was adequate (χ^2/df= 1.48, GFI=.55) but the paths from the exogeneous factors, routinization, supervison, complexity of work, previous educational level and job complexity were not significant. The second analysis examined the relationship between educational self-direction and teaching-centered beliefs about children's learning (See Figure 3). The overall fit was good (χ^2/df=1.55, GFI=.53) and as well two paths were significantly different from zero. High levels of routinization and high levels of supervision were associated with high levels of teaching-centered beliefs about children's learning.

Relationship between Educational Self-Direction and Flexibility.

Examination of the relationship between educational self-direction and intellectual flexibility followed the same statistical techniques as the analyses exploring the relationship between educational self-direction and beliefs about children's learning. First, the factor structure of the flexibility instrument was explored. A one factor model fit the data well (χ^2/df=2.7, GFI=.92). The factor loadings from this analyses were

specified in the structural equations modeling. In this model, the exogeneous variables were the 3 factors of educational self-direction, educational level, and job complexity. Tthe endogeneous variable was flexibility. The overall fit of the model was good ($\underline{\chi}^2/\underline{df}$=1.6, GFI=.53) and there were significant paths from routinization and complexity of work to flexibility/rigidity (See Figure 4). Highly routine work was associated with low levels of flexibilty. Also, unexpectedly, low levels of complexity of work were associated with high levels of flexibility.

Discussion

The aim of this study was to develop a measure that assessed educational self-direction, to assess the reliability and validity of this measure, and to explore the relationship between educational self-direction and two aspects of the psychological functioning of the learners. This discussion will consider issues in measuring educational self-direction; the relationship among educational self-direction, flexibility and beliefs about children's learning; and implications for teacher education.

Issues in Measuring Educational Self-Direction

The measure developed has three scales: routinization, closeness of supervision, and complexity of work. The measurement analyses indicated that the final version does represent three factors and that the scales of each factor have moderate to high reliabilities.

The measures of closeness of supervision, routinization and complexity described in this study were intended to assess the educational environment and not the perceptions, wishes or needs of individuals. The crucial test to determine whether this intention was achieved compared within- versus between-groups variance for the 10 groups. The multivariate test was significant ($p < .001$), and the univariate tests showed significance for both the routinization and closeness of supervision (for factor scores only) scales.

The significant between-group differences in the

routinization and closeness of supervision scales indicate the sensitivity of these two measures. All the subjects were in very similar training programs which focused on child development and education. CDA training programs are based on nationally defined objectives and guidelines. For example, all CDA trainees must learn about the development of children in 13 functional areas (e.g., cognitive, health, social) and how to organize a classroom which stimulates development in all these areas. This means the program differences found in the routinization and closeness of supervision scales reflect differences in the manner in which classes of similar content were taught. Greater differences among classes of different content taught by different teachers would be expected on both these scales.

In contrast to the results found for the closeness of supervision and routinization scales, the univariate test for between- versus within group differences on the complexity of work with data and people was not significant. The routinization and closeness of supervision scales focus on the instructor and classroom (e.g, How predictable is your class? How free do you feel to disagree with your instructor?) In contrast, the complexity scale asks how much time the students spent and how they spent their time. These questions seem more likely to elicit individual differences. The work demands made, and the questions asked by the teacher could be interpreted and executed differently for individual students. For example, students could use different levels of work with data to prepare for a test. Some could focus on rote memorization, others synthesis. This means that although teachers' expectations and requirements may set some

limits on the complexity of work, individual variation is possible.

A self-report measure on complexity of work, such as the one used in this study, may reflect an interaction of the environmental boundaries imposed by the teacher and the students' perception or cognitive functioning. In this study, there is no way to determine if this interaction does exist. Some form of external ratings of the educational environment would be necessary to explore the possibility and nature of such an interaction. Further data is currently being collected which explores this issue.

The data from the teachers suggest they may not be useful as external raters. The ratings of the teachers were significantly different from the students' rating on all three dimensions. Overall, the teachers rated the classroom as less routine, less closely supervised, and less complex than did the students. Of course these is no way of determining, from the available data, whether the students' or the teachers responses better represent the "true" environment.

Relationship between Educatonal Self-Direction and Psychological Functioning

Significant relationships were found between some factors of the questionnaire and beliefs about children's learning. Significant paths indicated that closeness of supervision and routinization were associated negatively with higher levels of teacher-centered beliefs. There was a non significant trend indicating high levels of complexity of work were associated with

teacher-centered beliefs. No factors were significantly related to beliefs about educational self-direction for children.

Kohn (1969) explored the relationship between closeness of supervision, routinization, and complexity of work with parental values. He found that freedom from supervision and substantive complexity of work were associated with values of self-direction versus conformity. These results are consistent with the findings on the relationship between the educational self-direction measure and teacher-centered beliefs.

Significant relationships were also found between some factors of the questionnaire and flexibility. Significant paths indicated that low levels of complexity of work and low levels of routinization were associated with high levels of flexibility. Closeness of supervision was not related to flexibility.

These results are not in total agreement with previous research conducted in both the job and educational environment. In the work environment, significant negative relationships between routinization and intellectual flexibility have been reported (Miller et al, 1979). This is consistent with the findings in this study. In both the work and educational environments significant relationships have been reported between complexity of work and intellectual flexibility (Miller et al, 1979; Miller et al, 1983). However, in both these previous studies the relationship was positive; in this study the relationship was negative. That is, in this study high complexity of work was associated with lower levels of flexibility. There is no plausible explanation for this finding.

Obviously longitudinal research must be conducted to properly

explore the psychological effects on the learner of environments with varying levels of educational self-direction.

Implications for Teacher Education

The theory and the data from this study do have important implications for teacher education, even though more work must be done before any implications should be adopted. The most important question is: Do classrooms with different educational environments change aspects of students' psychological functioning? Kohn's work (Kohn & Schooler, 1983) shows that dimensions of the work environment do influence aspects of psychological functioning. If the same relationships are established in the educational environment then the implications are obvious for teacher educators. If we believe that it is important to develop flexibility and beliefs about self-direction in children's learning in our students, then we should teach our preservice and inservice classes in the following way. We must demand high levels of complexity of work with data and people (multiple choice tests that assess rote memorization after a series of lectures is not complex work), provide freedom from supervision (e.g. give students some choices in the content, type and scheduling of assignments), and strive for classes that have low levels of routinization.

It is unlikely that further research will find high levels of change in the psychological functioning of students in different educational environments. Compared to the work environment, education can be considered a "weak treatment" for teachers. Work is full time; inservice education is not. Some of the

relationships found by Kohn were over a 10-year period; teacher education takes a much shorter period of time. But, if further empirical research supports this theory, we do have guidelines for conducting pre- and inservice training, assuming that we wish develop teachers who are flexible and have beliefs about educational self-direction. Teaching in a way that requires little complexity, that closely supervises students, and is highly routine guarantees we will not effect change of this type; teaching in a way that demands complexity of work, allows freedom from supervision and has low levels of routinization provides the possibility that some change of this type may occur.

Table 1

Means, Standard Deviations, Item-total Correlations and T-Values for the Routinization Scale[a]

Items[b]	Mean	S.D.	Item-Tot. Corr.	T-Value[c]
1. When I come to class I can predict what will happen that day.	3.3	1.3	.27	1.8
2. What goes on in my classes is unpredictable; unexpected things often come up.	3.9	1.2	.23	1.6
3. The training involves the same thing repeatedly.	3.6	1.3	.21	2.3
4. The training is routine; it involves doing the same thing over and over.	3.9	1.1	.31	3.2
5. How predictable are you classes?	2.0	.9	.34	4.4
6. Does your training involve doing different things or the same things over and over?	3.8	.9	.42	10.0
7. How routine is your training?	2.8	.1	.56	6.8
8. How much of your training is predictable?	2.6	.9	.50	11.3
9. How much of your training is routine?	2.7	1.0	.56	1.5
10. How frequently do you do multichoice or short answer tests?	2.6	1.1	.18	2.2

[a] Cronbach's Alpha=.69. Goodness of fit indices: χ^2/df=2.67, GFI=.66.

[b] All items required responses on a 5-point Likert-type scale. The content of the scales was different for different items, e.g. Items 1 to 4 had scales of the form "strongly disagree" to "strongly agree," Item 8 had a scale of the form "all" to "none."

[c] A T- Value is the factor loading divided by the standard error. T values greater than 2 are considered significant.

Table 2

Means, Standard Deviations, Item-Total Corrlelations and T-Values for the Closeness of Supervision Scale[a]

Items[b]	Mean	S.D.	Item-tot. Corr.	T-Value[c]
1. The instructor decides what the students do and now they do it.	2.7	1.2	.34	4.1
2. The instructor allows the students the freedom to decide what they will do and how they will do it.	2.2	1.2	.28	2.8
3. The instructor does not like us to disgaree with him/her.	4.6	.8	.18	2.1
4. Who decides what topic or content is covered in your trianing?	1.7	1.0	.36	5.8
5. Who decides when certain topics or content is covered in your training?	1.6	.9	.39	5.9
6. Who decides how certain topics of content is covered in your training?	1.7	.8	.34	4.8
7. Who decided what type of assignments are done in training ?	1.4	.6	.26	3.0
8. Who decides the topics or content of the assignments.	1.9	1.2	.33	4.2
9. Who decided when certain assignments are due or tests are scheduled?	2.0	1.0	.27	3.1
10. Who decides the speed at which you do your work related to training?	3.1	1.0	.28	2.8

[a] Cronbach's A;pha= .63. Goodness of fit indices: χ^2/df=2.1, GFI=.91

[b] All items required responses on a 5-point Likert-type scale. The content of the scales was different for different items, e.g. Items 1 to 3 had scales of the form "true" to "false" Item 8 had a scale of the form "trainer decides" to "student" decide."

[c] A T- Value is the factor loading divided by the standard error. T values greater than 2 are considered significant.

Table 3

Means, Standard Deviations and T-Values
for Complexity of Work with People[a]

Items	Mean	S.D.	T-Values
Time Spend working people	5.0	6.2	1.1
Category on which most time is spent	2.6	1.5	.8
How frequenty do you[b]			
a. Listen to lecture	3.5	1.3	4.5
b. Engage in discussion	3.4	.8	8.7
c. Work on a group project	2.4	1.3	5.3
d. Negotiate with instructor	2.4	1.0	4.8
e. Tutor your peers	1.7	1.2	2.1

[a]Goodness of fit indices: $\underline{\chi}^2$ /df = 2.95, GFI= .90

[b]Range of possible responses from 1 (never) to 2 (very frequently)

Table 4

Means, Standard Deviations and T-Values
for Complexity of Work with Data[a]

Items	Mean	S.D.	T Values
Time Spend working with data	6.6	6.2	1.4
Category on which most time is spent	3.2	1.2	2.4
How frequenty do you[b]			
a. memorize	2.9	1.1	3.9
b. Comprehend	3.6	.9	6.2
c. Analyze	3.4	.9	10.1
d. Apply	4.1	.9	8.2
e. Sythnesize	3.5	.9	9.1
f. Evaluate	3.3	1.1	10.6

[a] Goodness of fit indices: $\chi^2/df = 2.95$, GFI= .84

[b] Possible range of responses from 1 (never) to 5 (very frequently)

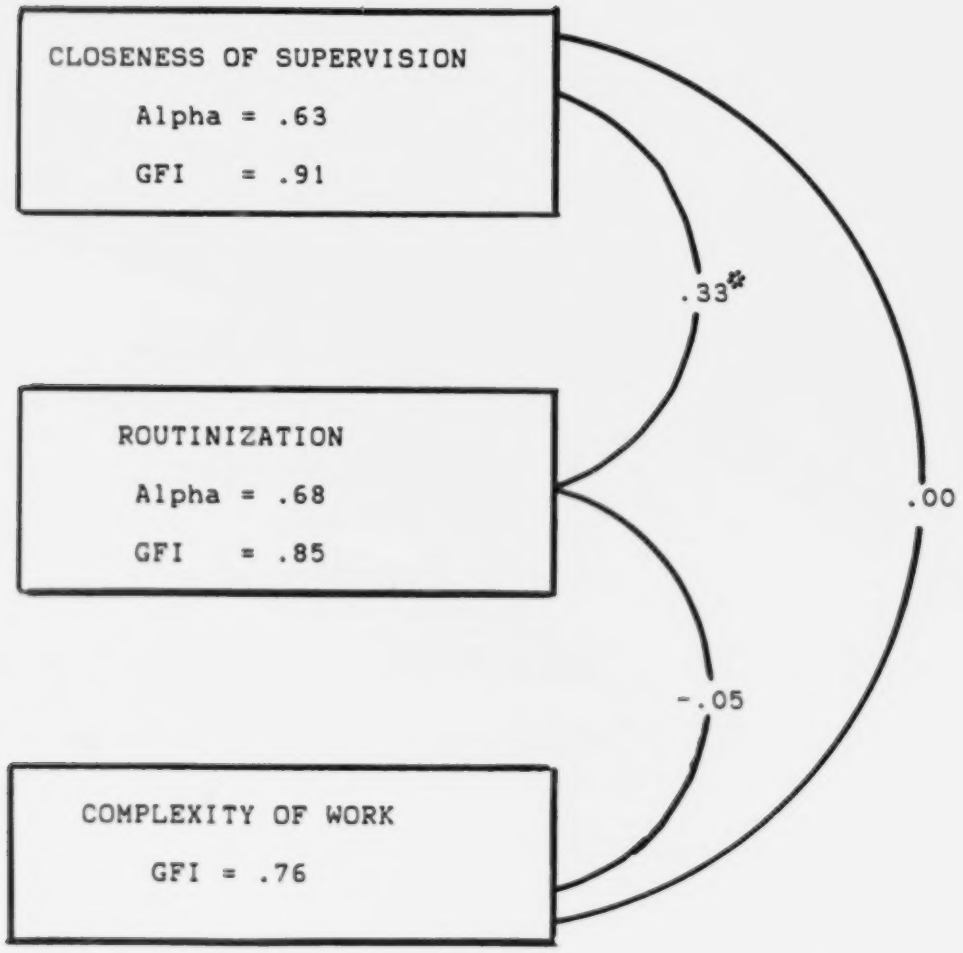

Figure 1. Factor structure of Educational Self-direction

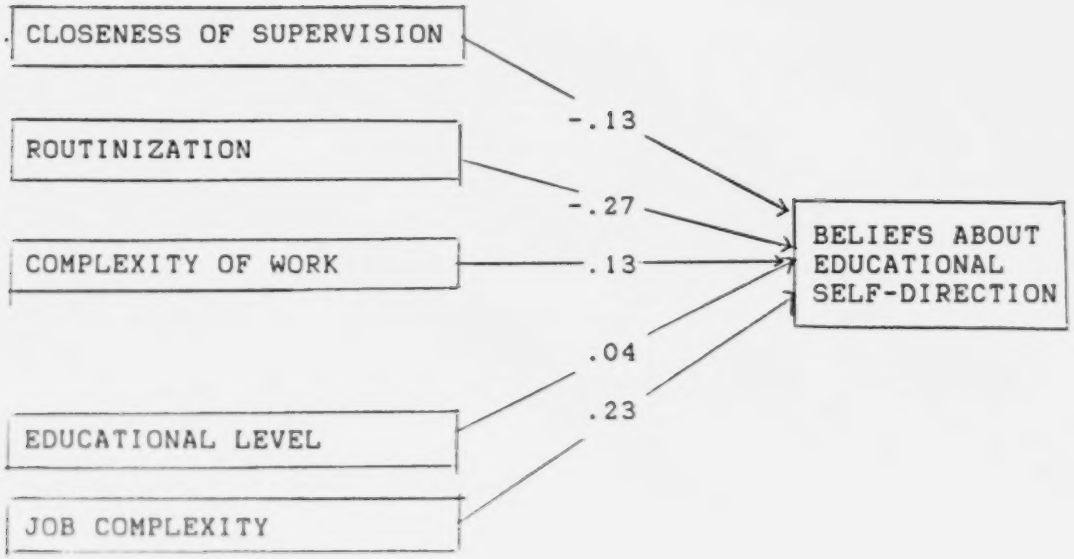

Figure 2. Relationship between Educational Self-Direction and Beliefs about Educational Self-Direction

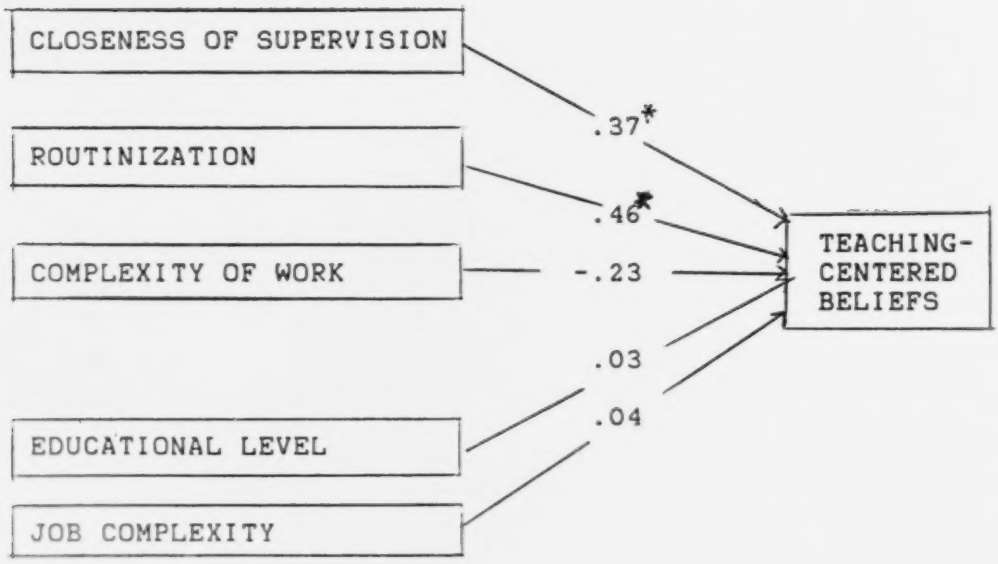

Figure 3. Relationship between Educational Self-Direction and Teaching-Centered Beliefs.

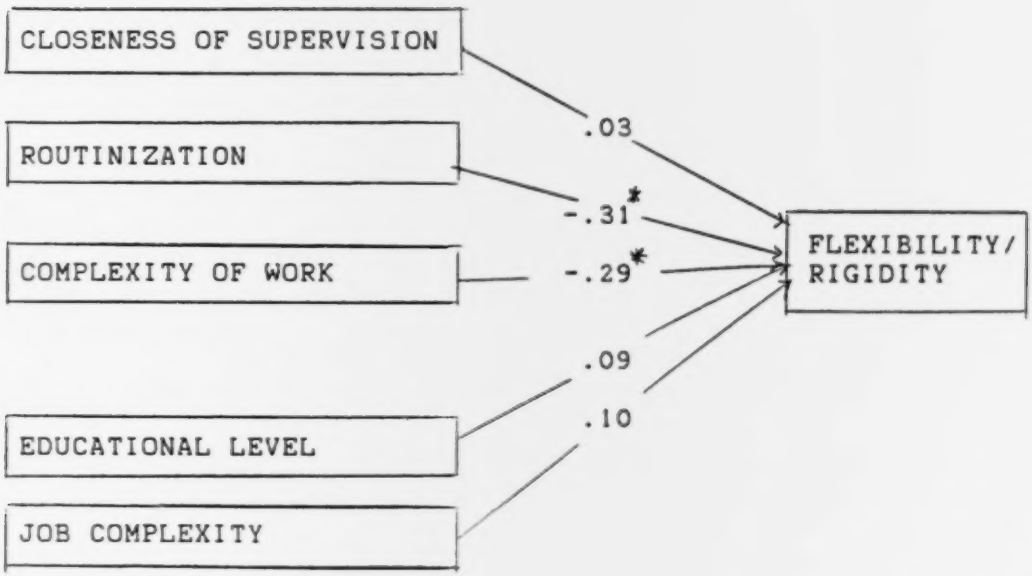

Figure 4. Relationship between Educational Self-Direction and Flexibility/Rigidity.

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